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Glenn Patent Group
Suite L
3475 Edison Way
Menlo Park, CA 94025

EXAMINER	
LERNER, MARTIN	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 10/089,950	Applicant(s) NEUBAUER ET AL.	
	Examiner Martin Lerner	Art Unit 2626	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *21 September 2007*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1 to 11 and 13 to 16* is/are pending in the application.

4a) Of the above claim(s) *11 and 14* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1 to 4, 6, 8, 10, 13, and 15 to 16* is/are rejected.

7)☒ Claim(s) *5, 7, and 9* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Election/Restrictions

1. Applicants' election without traverse of Group I, Claims 1 to 10, 13, and 15 to 16, in the reply filed on 21 September 2007 is acknowledged.

2. Claims 11 and 14 are withdrawn from further consideration pursuant to 37 CFR 1.142(b) as being drawn to a nonelected invention, there being no allowable generic or linking claim. Election was made **without** traverse in the reply filed on 21 September 2007.

Claim Objections

3. Claim 9 is objected to because of the following informalities:

There is a lack of antecedent basis for "the predetermined amount". Claim 9 should depend upon claim 8, not upon independent claim 1, and is so treated for purposes of examination Appropriate correction is required.

Claim Rejections - 35 USC § 102

4. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

5. Claims 1, 2, 4, 10, 13, 15, and 16 are rejected under 35 U.S.C. 102(b) as being anticipated by *Lee et al.*

Regarding independent claims 1 and 13, *Lee et al.* discloses a method and apparatus for adding auxiliary data subband samples to a subband-coded compressed digital audio signal, comprising:

"processing the data stream to obtain the spectral values of the short-term spectrum of the audio signal" – a subband filter bank 120 performs a time domain to frequency domain mapping of the audio signal into N (N = 32) equally spaced subbands; each output of the subband filter faithfully represents the part of the audio signal that falls into that spectral subband ("spectral values") (column 7, lines 14 to 22: Figure 1); implicitly, the subbands signals are "spectral values" that represent the "short-term" spectrum because there are a set of subband signals for each frame of audio, where a frame represents a short-term time period;

"combining the information with a spread sequence to obtain a spread information signal, wherein the information includes information bits, and wherein the combining including spreading the bits based on a spread spectrum modulation by combining the bits with the spread sequence" – auxiliary data subband samples SPD_0, SPD_1, SPD_2, . . ., SPD_{N-1} can be spread spectrum signals which are generated from a subband filtered pseudo-noise (PN) sequence and from an auxiliary data waveform (column 11, lines 26 to 37: Figure 4);

"generating a spectral representation of the spread information signal to obtain a spectral spread information signal" – an auxiliary data signal is provided via lines 418

and 422 to a plurality of modulators 430, 432, 434, and 436 which modulate the data carrier subband samples SP_0, SP_1, SP_2, . . ., SP_{N-1}, which carry the auxiliary data subband samples (column 11, lines 45 to 52: Figure 4); auxiliary data subband samples SPD_0, SPD_1, SPD_2, . . ., SPD_{N-1} can be spread spectrum signals which are generated from a subband filtered pseudo-noise (PN) sequence and from an auxiliary data waveform (column 11, lines 26 to 37: Figure 4);

"establishing a psychoacoustic maskable noise energy as a function of frequency for the short-term spectrum of the audio signal, wherein the psychoacoustic maskable noise energy is smaller or the same as the psychoacoustic masking threshold of the short-term spectrum" – a psychoacoustic model 160 calculates a signal-to-mask ratio (SMR) which is used in subsequent bit allocation and quantization; the SMR is indicative of the noise level in each subband that would be barely perceptible to the average person, and is proportional to the audio signal energy in the subband; the psychoacoustic model 160 accounts for masking phenomena between subbands (column 7, lines 23 to 34: Figure 1);

"weighing the spectral spread information signal by using the established noise energy to generate a weighted information signal, wherein the energy of the introduced information is substantially equal to or below the psychoacoustic masking threshold" – a power control signal is provided via line 419 to modulator 420 to adjust the power of the auxiliary signal carried on line 418; the power control signal ensures that the auxiliary data signal is below the noise quantization floor of the audio subband samples (column

11, lines 53 to 62: Figure 4); thus, the auxiliary data subband samples are carried substantially inaudibly (column 11, line 67 to column 12, line 1);

"summing the weighted information signal with the spectral values of the short-term spectrum of the audio signal to obtain sum spectral values including the short-term spectrum of the audio signal and the information" – the modulated auxiliary data spread spectrum signals SPD_0, SPD_1, SPD_2, . . ., SPD_{N-1} and the audio subband samples SP_0, SS_1, SS_2, . . ., SS_{N-1} combine to produce combined samples SS_0', SS_1', SS_2', . . ., SS_{N-1}', in which the auxiliary data subband samples are carried substantially inaudibly (column 11, line 63 to column 12, line 3: Figure 4);

"processing the sum spectral values to obtain a processed data stream including the data about the spectral values of the short-term spectrum of the audio signal and the information to be introduced" – the thirty-two quantized data samples are provided to a bitstream formatting and encoder function 150 via line 145, wherein each subband sample can be encoded using conventional modulation techniques (column 8, lines 7 to 17: Figure 1).

Regarding claim 2, *Lee et al.* discloses the steps of:

"inverse quantizing the quantized spectral values to obtain the spectral values" – demultiplexer and unpack function 405 demultiplexes frames or packets of digital audio data from the signal; the audio subband samples 240 are unpacked and provided to an inverse quantizer 404 via line 402 (column 10, lines 42 to 50: Figure 4);

"quantizing the sum spectral values to obtain the sub-spectral values" – de-normalized combined subband samples SS_0', SS_1', SS_2', . . ., SS_{N-1}' are provided via line 452 to quantizer 454, which quantizes the combined samples (column 12, lines 18 to 30: Figure 4);

"forming the processed data stream using the quantized sum spectral values" – the quantized data, the unpacked compression parameters, and the control data are packed into a new frame (column 12, lines 28 to 31: Figure 4).

Regarding claim 4, *Lee et al.* discloses a psychoacoustic model 160 calculates a signal-to-mask ratio (SMR) which is used in subsequent bit allocation and quantization; the SMR is indicative of the noise level in each subband that would be barely perceptible to the average person, and is proportional to the audio signal energy in the subband; the psychoacoustic model 160 accounts for masking phenomena between subbands (column 7, lines 23 to 34: Figure 1).

Regarding claim 10, *Lee et al.* discloses that quantizer 454 quantizes the combined samples using bit allocation data provided via lines 407 and 459 to provide quantized data at line 456 (column 12, lines 25 to 30: Figure 4); thus, the same quantization parameters that were demultiplexed and unpacked for inverse quantizer 404 are employed to again quantize the combined signal at quantizer 454.

Regarding claim 15, *Lee et al.* discloses that the auxiliary data subband samples SPD_0, SPD_1, SPD_2, . . ., SPD_{N-1} can be spread spectrum signals which are generated from a subband filtered pseudo-noise (PN) sequence and from an auxiliary waveform (column 11, lines 26 to 37: Figure 4).

Regarding claim 16, *Lee et al.* discloses at least one technique for encoding a sparse PN sequence with "sample twiddling", where, if a least significant bit of the subband sample is "1", and the current sparse PN sequence value is "+1", then the LSB of the modified subband samples is unchanged ("for an information bit with a first logic level, the spread sequence is included unchanged into the spread information signal"); if the current sparse PN sequence value is "-1", the LSB of the modified subband sample is flipped to 1-1=0 ("for an information bit with a second logic level, an inverse spread sequence is included into the spread information signal") (column 17, lines 13 to 26).

Claim Rejections - 35 USC § 103

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

7. Claims 3 and 6 are rejected under 35 U.S.C. 103(a) as being unpatentable over *Lee et al.* in view of *Johnston*.

Concerning claim 3, *Lee et al.* discloses that additional compression techniques including Huffman coding may be employed to represent the quantized samples, where Huffman coding is an entropy-encoding technique, implicitly. (Column 8, Lines 12 to 15: Figure 1) Thus, *Lee et al.* suggests entropy-encoding quantized sum spectral values, but omits entropy-decoding the entropy-encoded spectral values to obtain the quantized spectral values, which is somewhat contrary to an objective to embed inaudible auxiliary data in a subband-encoded compressed digital audio signal without the need to fully decompress the signal. (Column 10, Lines 35 to 39: Figure 4) However, in so stating, *Lee et al.* recognizes that the subband-encoded compressed digital audio signal could be decompressed and then recompressed in a manner analogous to dequantizing and requantizing to add the auxiliary signal to the subband-encoded compressed digital audio signal. Generally, then, *Johnston* teaches an entropy encoder 208 is used to achieve further noiseless compression of a quantized audio signal to perform a lossless encoding on the quantized audio signal, where the entropy coder 208 may operate by a Huffman coding technique. (Column 7, Lines 58 to Column 8, Line 19) An objective is to further reduce channel bit rate requirements, or storage capacity for storage applications. (Column 3, Lines 50 to 59) It would have been obvious to apply an entropy-decoding and entropy encoding technique analogous to the dequantization and requantization of *Lee et al.* for a purpose of reducing channel bit rate or storage capacity requirements as suggested by *Johnston*.

Concerning claim 6, *Lee et al.* discloses that scale factors, which represent the dynamic range of the spectral envelope for each subband, are encoded separately from

the subband signals, but are encoded in packets or frames of data, where a frame 250 includes a scale factor portion 230, indicating the dynamic range of the subband samples. (Column 7, Lines 45 to 47; Column 8, Lines 7 to 10; Column 8, Lines 33 to 35: Figures 1 and 2) Thus, scale factors are present as side information. *Lee et al.* does not expressly say that the scale factors are related to the noise energy introduced by quantizing, where the noise energy is a measure for the psychoacoustic maskable noise energy, which is used by modulator 420 to control the power of the auxiliary data signal. However, *Johnston* teaches that the quantization noise is considered for quantizing the spectral values in a way that the amount of the noise will be masked by a masking threshold that rules the quantization level of each spectral component, and that the quantization process affects the scale factors, as each band has the same step size or scale factor, which is directly computed from the masking threshold. (Column 11, Lines 8 to 65; Column 21, Line 67 to Column 22, Line 16) An objective is to obtain less noise and encode into fewer bits by determining the scale factors to be used for quantizing the signal. (Column 3, Lines 60 to 68) It would have been obvious to one having ordinary skill in the art to provide scale factors as side information in a method of adding auxiliary data subband samples to a subband-coded compressed digital audio signal of *Lee et al.* so that the scale factors are a function of the noise energy introduced by quantization as a measure of psychoacoustic maskable noise as taught by *Johnston* for a purpose of obtaining less noise and encoding with fewer bits.

8. Claim 8 is rejected under 35 U.S.C. 103(a) as being unpatentable over *Lee et al.* in view of *Hinderks ('363).*

Lee et al. discloses a power control signal is provided via line 418 to modulator 420 so that the auxiliary data signal is below the noise quantization floor of the audio subband signals, where the auxiliary data subband signals are carried substantially inaudibly. (Column 11, Line 53 to Column 12, Line 3: Figure 4) Moreover, a psychoacoustic model 160 is used for account for masking phenomenon. (Column 7, Lines 23 to 34) However, *Lee et al.* does not expressly disclose that the noise energy is less than the psychoacoustic masking threshold by "a predetermined amount", where the power control signal is applied so that the auxiliary data subband signals have an energy corresponding to the predetermined amount. Still, one skilled in the art would understand that the purpose of psychoacoustic masking thresholds is to keep the noise energy introduced by quantization below the psychoacoustic masking threshold, and to adjust the power of the auxiliary data subband signals so that they are below the psychoacoustic masking threshold, and, thus, are carried inaudibly. Specifically, *Hinderks ('363)* teaches that a power adjustment controller at a transmitter is manipulated by adjustment means so that a second transmitted signal is set below the global masking threshold associated with psychoacoustic effects to eliminate noise. (Column 2, Lines 20 to 25; Column 3, Lines 23 to 54) Implicitly, if the quantization noise and the power of the auxiliary data subband signals are below the masking threshold, then they are smaller than the psychoacoustic masking threshold by "a predetermined amount" because the predetermined amount can be arbitrarily close to zero. The

objective is that the second transmitted signal cannot be perceived by the human ear and noise in the auditory frequency range is effectively eliminated. (Column 2, Lines 26 to 29) It would have been obvious to one having ordinary skill in the art to weigh the spectral values of the information signal so that they have a noise energy introduced by quantization smaller than the psychoacoustic masking threshold by a predetermined amount as suggested by *Hinderks ('363)* in a method of adding auxiliary data subband samples to a subband-coded compressed digital audio signal of *Lee et al.* so that noise in an auditory frequency range is effectively eliminated.

Response to Arguments

9. Applicants' arguments filed 05 April 2007 have been considered but are moot in view of the new grounds of rejection.

Allowable Subject Matter

10. Claims 5, 7, and 9 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Conclusion

11. The prior art made of record and not relied upon is considered pertinent to Applicants' disclosure.

Herre ('971), Yin, Herre et al. ('672), Araki, and Moses disclose related art.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Martin Lerner whose telephone number is (571) 272-7608. The examiner can normally be reached on 8:30 AM to 6:00 PM Monday to Thursday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David R. Hudspeth can be reached on (571) 272-7843. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

ML
10/16/07

Martin Lerner
Examiner
Group Art Unit 2626